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INTRUSIVE AND NON-INTRUSIVE INSTRUCTION IN DYNAMIC SKILL TRAINI--ETC(U)  
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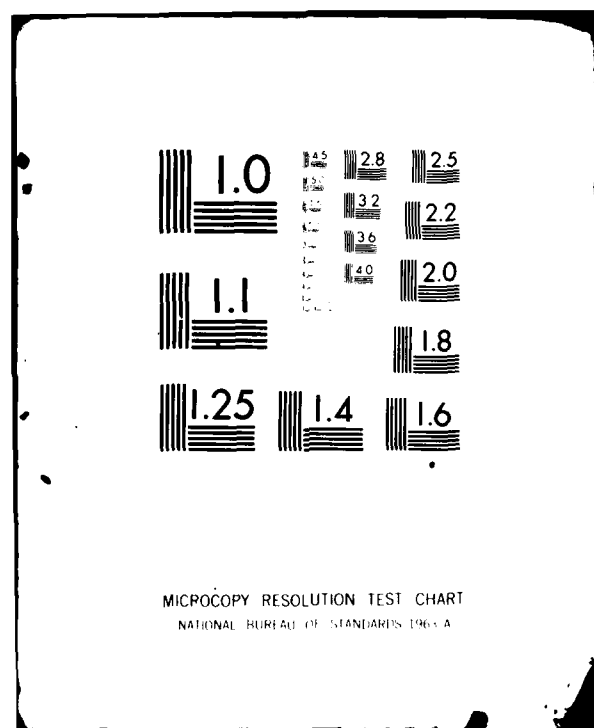
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Intrusive and Non-Intrusive Instruction  
in Dynamic Skill Training

Allen Munro  
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BEHAVIORAL TECHNOLOGY LABORATORIES

Department of Psychology

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Technical Report No. 97  
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Department of Psychology  
University of Southern California

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## ABSTRACT

A distinction is drawn between computer based instruction of knowledge systems and computer based instruction of dynamic skills. There is reason to expect that the findings of research on knowledge system instruction will not apply universally to dynamic skill instruction. In particular, a theory of cognitive resource demand suggests that the principle of immediate instructional feedback may not apply in dynamic skill training. Because students in dynamic skill training are often heavily loaded with processing demands, instructional feedback must be postponed until the students have sufficient free resources to process it. This hypothesis was tested in an experiment in computer based instruction. One group of students received instructional feedback upon request, while a second group received feedback under program control. The group with control over feedback made significantly fewer errors in training than did the group that did not control timing of the instructional feedback messages.



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INTRUSIVE AND NON-INTRUSIVE INSTRUCTION  
IN DYNAMIC SKILL TRAINING

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## INTRODUCTION

There has been little academic research on computer based dynamic skill training (see Munro, Towne, & Fehling, 1981). Instead, the bulk of academic research on computer based learning systems has dealt with knowledge system teaching. By knowledge systems we mean coherent bodies of essentially propositional knowledge. By dynamic skills we mean bodies of knowledge that coordinate perception, motor skills, and decision making in real time driven environments. Existing computer based training devices for dynamic skills are typically vehicle simulation practice environments. Examples include aircraft and helicopter simulators for pilot training. Such training installations are typically very expensive (more than one million dollars per unit). They are typically fully utilized for training, with no available time for research. In addition, the demands of verisimilitude frequently result in simulator designs that cannot provide the flexibility of programming required by computer based learning research.

Recent advances in the development of low cost microcomputer systems make possible research on computer based dynamic skill training using systems developed solely for that research purpose. Such a low cost computer based learning research tool has been developed in our laboratory (Munro, Towne, & Fehling, 1981). This experimental system for the study of dynamic skill training is being used to conduct a series of experiments on a number of issues. This technical report describes the first experiment in a planned series.

It may be dangerous to assume that the research findings on

computer based learning of traditional knowledge systems will apply to dynamic skill training. The present experiment was designed to explore certain contrasts between dynamic skill training and knowledge system teaching in computer based learning. Two principles of knowledge system training are challenged in the dynamic skill training environment. The first of these is that instructional feedback (knowledge of results) should be immediate. The second is that student control over instructional pacing or sequence does not ordinarily result in a large improvement in learning.

#### The Dynamic Skill Training Task

The training task is loosely based upon the task of Navy Air Intercept Controllers. In the laboratory task, there are two display screens, one representing a radar screen, the other the display console of a tracking computer. A keyboard with fifteen specially labeled command keys and a numeric keypad is used for student input to the simulated tracking computer. The students use a joystick and certain keyboard keys to place identifying symbols on the simulated radar screen. The task calls for close attention to the simulated radar screen, which is updated once every eight seconds. Students must quickly execute a series of key presses in response to certain events observed on the radar screen, such as the appearance of a new blip or the movement of simulated friendly and enemy aircraft into a particular proximity. In addition, the student must keep track of certain tasks that are periodically required, such as determining fuel and weapons status for the simulated aircraft.

There are many opportunities for errors in this task. When the

training system detects a student error, it can present information about the error in a reserved area of the simulated tracking computer console screen. In the first experiment, two different methods of determining when to present these messages were employed. For the intrusive feedback group, these error messages were automatically presented at the time that the system detected the errors. For the non-intrusive feedback group, an error message was shown only when requested.

A student's interaction with the Air Intercept Controller training system has parallels to a conversational interaction between two people. In normal conversation, the participants exchange indications of their readiness to accept input from each other: they signal turn-taking in the conversation. In conventional knowledge system teaching in CBI, each student response (such as typing in the answer to a question) can be thought of as a signal that the student has completed and surrendered a conversational turn. After making a response, the student expects a reply from the teaching system. In dynamic skill training, however, each student interaction with the simulation system is not a signal that the student is surrendering a turn. Instead, the student remains actively engaged with the simulation, preparing a series of actions in response to observed and expected events. In this context, the interjection of an instructional feedback message is an intrusion. The system is, in some sense, breaking in on the student's turn.

This "conversational rules" hypothesis is just a special case of an attentional demand hypothesis. In a complex training session, most of a student's cognitive processing resources are likely to be

allocated to attending to and responding to the task itself. If the task is suddenly intruded upon by an instructional message, the intrusion will demand additional processing resources to perform the attentional shift. This surge in processing resource demand is likely to interfere with the normal learning and performance processes. If the disruption occurs at a point in the task when a large percentage of cognitive resources are already committed, then either attention to feedback or performance on the task is likely to suffer. The attentional demand hypothesis predicts that feedback given intrusively will be more disruptive of learning than will feedback provided non-intrusively.

Conversational cooperation can be viewed as an adaptation to information processing resource limitations. A dynamic skills training system that partially emulates some of the features of conversational turn-taking in instructional feedback should prove superior to a system that interrupts student task processing with instructional messages. In the experiment, cooperative turn-taking is emulated by signaling a readiness to provide feedback in a non-intrusive way, and then postponing the presentation of the message until the student explicitly surrenders a turn and requests presentation of feedback.

Argument can be found to predict that the non-intrusive feedback condition (student paced presentation of feedback) could present difficulties for representational (as opposed to attentional) processes. Students in the non-intrusive group frequently postpone viewing a feedback message until some time after the commission of the error. The results of studies on delay of reinforcement during learning can be interpreted to imply that such a delay will be

detrimental to learning. According to this argument, feedback serves as a reinforcer, and, therefore, the delays which occur in the non-intrusive condition should impair overall student performance. A cognitive view of this line of reasoning is that when the feedback message is delayed it is more likely that the content of such a message will not be correctly related to the student's representation of the task. The student may not understand to which context the feedback message refers. On the other hand, a student whose feedback is presented intrusively always receives the feedback message immediately following the context for which it is generated and so should not suffer this representational (or reinforcement) disadvantage.

We do not expect the potential representational disadvantage for non-intrusive group students to be as important as the attentional disadvantage for intrusive group students. We postulate that students have an ability to remember the context to which a feedback message refers from the content of that message. The research specifically addressed to delay of knowledge of results can be interpreted to support this point of view (Kling & Schrier, 1971). In these studies it appeared that making students wait for feedback was not detrimental if little or no responding was required during the wait interval. This suggests that students were able to maintain a memory of the context for the knowledge of results information. If students in our Air Intercept Controller training task were similarly able to recall the context of a feedback message, then it would follow that students receiving feedback non-intrusively would not suffer a representational or reinforcement disadvantage.



## The Experiment

### Method

Subjects. Subjects were paid volunteers who responded to posted notices and/or class announcements made at two colleges (El Camino College and California State University, Dominguez Hills) and one high school (Redondo Beach High School). Thirty-five subjects participated in the experiment. Of these, thirty completed the experimental training task. Three subjects were dropped from the experiment due to poor performances. Two of these failed to correctly follow directions in the preliminary training phase, before the practice training of interest. One was dropped because of failure on all 30 practice problems, including those that were performed successfully by all other students. Two of the thirty-five subjects chose to discontinue the experiment before completion. Subjects were assigned to one of the two experimental groups in alternating order as they arrived for the experiment. Each subject who completed the training received fifteen dollars. Students who chose to terminate their participation or who were dropped due to poor performance received either five or ten dollars, depending on the length of their participation.

Procedure. Subjects were run individually in the experiment. Completion of the training session required from three hours twenty minutes to four and one-half hours. All subjects first viewed a six minute videotaped explanation and demonstration of the Air Intercept Controller task. They then were instructed in the functions of each of the control devices used in the simulated task--thirteen specially labeled keyboard keys and a joystick--by a computer-based-training

program called Pre-AIC. The Pre-AIC program consisted of a series of text presentations describing the task in greater detail than had been presented in the videotaped introduction. It also presented simulation segments that the student was required to interact with by using the control keys and joystick. Students who failed to complete two or more of the twelve training modules were dropped from the experiment. Two of the thirty-five subjects were disqualified from the experiment by this criterion.

After completing the Pre-AIC computer-based instruction program, all students then viewed the same videotaped sequence reviewing the Air Intercept Controller task and stating the requirements of the task. This tape segment lasted eight minutes. At this point the treatment of students in the two groups diverged. Each group viewed a videotape segment describing the way in which instructional feedback would be presented and how they should respond. This tape segment lasted one minute and twenty seconds for the intrusive feedback group and three minutes and thirty seconds for the non-intrusive feedback group. Students were then given a five minute break from the training task. At the end of the break, students were given practice in the Air Intercept Controller task, using a simulator trainer program called AIC. The AIC program presented a series of 30 problems to the student, organized in four banks of five, ten, ten, and five problems. Difficulty was held roughly constant within each bank, but increased with the progression of problem banks. Students in both groups received the same problems, and the training program was the same for students in the two groups in every respect except instructional feedback.

Instructional Feedback Treatments. The AIC program continually monitored student performance for a variety of errors. Examples include inaccurately positioning a symbol on the simulated radar screen, or failing to get a fuel status update from the pilots of the simulated aircraft within the required time. The Appendix contains a complete list of these errors. For both feedback conditions, when the AIC program detected an error, a warning tone sounded and the word "Advisory" appeared in an area of the computer console display reserved for instructional messages.

At this point, those students in the intrusive feedback group were presented with a one- to four-line instructional message related to the error just detected. While the message was displayed, the simulation was frozen. The radar screen did not change, and all the normally active keys of the computer console were dead. Only one key, the "Accept message" key could be pressed by the student with effect. When this key was pressed, the instructional feedback message was erased from the screen and the problem continued, resuming at the point at which it had been frozen. If more than one error had been detected at one time, they were presented in sequence, from most to least recent, as the student pressed the "Accept message" key, until all were seen by the student. After the last currently active message was seen, the word "Advisory" was erased from the screen along with the last message.

The students in the non-intrusive feedback group were not immediately presented with the instructional message after the system sounded the error tone and displayed "Advisory" in the reserved area.

Thus, unlike the students in the intrusive condition, the non-intrusive Feedback Group members were able to choose the time of the appearance of the error messages by depressing a special "Help" key. Depressing this key caused the error message to appear and the simulation to freeze until the student pressed the "Accept message" key. If more than one error had been detected by the system before the feedback message was requested, then the student was first presented with the most recent error message. In each case, depressing the "Accept feedback" key caused the error message to be erased and the simulation to resume. When all pending feedback messages had been presented, the word "Advisory" was removed. If, at the end of a problem, the student had not reviewed messages for all the errors detected by the system, then the student was given the option of seeing these messages before beginning the next problem.

In summary, students in the intrusive feedback group were presented with an error message for each detected new error at the time that the AIC program recognized the error. Students in the non-intrusive feedback group had the option of determining when and whether they would view the error messages.

Data collection. The AIC simulation training program preserved an exhaustive record of each student's interactions with the program. These data sets were later processed by data extraction programs to produce records of errors, time on problems, and other variables of interest.

## Results

Errors. Number of errors per problem was used as one measure of learning. Table 1 presents an analysis of variance of the error data. The mean number of errors for the students in the non-intrusive group was 9.17, and for the intrusive treatment group, the mean number of errors per problem was 15.67. This difference was highly significant, suggesting that students in the non-intrusive group learned more than those in the intrusive group.

Errors, last ten problems. A second analysis was performed, using only the error data from the last one-third of the thirty practice problems. These problems, which were longer and more difficult than most of the previous problems, were treated as a measure of final training performance in this analysis. Students in the non-intrusive feedback group made a mean of 14.74 errors per problem in these ten problems. In the intrusive group, the mean was 22.82 errors per problem.

It is possible that the comparison of total errors made in practice training, given in Table 1, is not the best measure of learning. If students learn from making errors, then fewer errors in training might not portend better performance on the final task. After twenty problems, however, some training has taken place. Yet the data of Table 2 reveal that the students in the non-intrusive group made fewer errors in the last ten problems than those in the intrusive group. This result suggests that non-intrusive feedback promotes learning in dynamic skill training.

Time per problem. The time spent on each problem by each student was recorded. Table 3 presents the analysis of the time on problem data, where time is expressed in tenths of seconds. Intrusive group students spent a mean of 264.7 seconds per problem, and non-intrusive group students took 274.3 seconds. This difference was not significant.

It had been predicted that students in the non-intrusive group would require significantly less time per problem than those in the intrusive group. In retrospect, it can be seen that this prediction is in partial conflict with the prediction of fewer errors for the non-intrusive group. Some errors, such as allowing one's fighters to be shot down by the enemy, resulted in premature termination of problems. Because intrusive group students are more likely to make such errors, a prediction of shorter time per problem for intrusive group students would have been appropriate. In any case, the experimental results do not permit the rejection of the null hypothesis that there is no difference in time to complete problems for the two groups.

Crucial and non-crucial errors. Student errors are classified by the AIC program into thirty-six types. Of these, twenty-three may be termed "crucial" errors, in that they are likely to materially affect the student's chances of "winning" an exercise by shooting down the enemy aircraft. The other thirteen types of errors are non-crucial in that they reflect errors of form that will not immediately decrease the chances of winning the problem. Table 4 presents the analysis of crucial errors for all thirty problems. It shows a small but significant difference in number of crucial errors per problem between

the two groups. The non-intrusive feedback group made an average 5.36 crucial errors per problem, while the intrusive group made 6.14. Table 5 shows a significant and much larger difference in non-crucial errors. The mean number of non-crucial errors per problem for the non-intrusive training group was 3.18. For the intrusive feedback group, the mean was 9.53 errors per problem. These results suggest that, even though overloaded by the intrusive instructional messages, the intrusive group students are still able to decide which performance factors to attend to. They choose to permit greater deterioration of their non-crucial performance rather than their crucial performance.

Joystick errors. In an attempt to determine what kind of performance is affected by the intrusiveness of instructional feedback, a separate analysis of joystick errors was performed. Most of the AIC task requires the fusion of skills of planning, time or distance estimation, and decision making, as well as some motor coordination. One essential skill, however, is primarily one of motor coordination. This is the task of using the joystick and keyboard to "hook" a symbol on a simulated radar screen blip. Table 6 shows that there was no significant difference in the total number of joystick errors made by students in the two instructional treatment groups over the course of the thirty practice problems. This implies that the deleterious effect of intrusive feedback may not equally degrade all types of skills. The motor skill of using the joystick appears not to be harmed by the processing loads imposed by intrusive feedback.

### Discussion

The results support our hypothesis that the processing demands of dynamic skill simulation training require non-intrusive rather than intrusive feedback. Students trained with the intrusive feedback method committed significantly more errors, both in the last set of problems and throughout the practice training, than did those trained by the non-intrusive method. Intrusive group students made significantly more errors of both crucial and non-crucial types. This higher incidence of errors is evidence that, in this dynamic skill training system, students who receive intrusive instructional feedback learn less well than those who have control over when the feedback will be presented.

A conversational analogy to computer based training is presented above. In normal conversation, the participants take turns talking, exchanging special signals to indicate a willingness to surrender a turn or to request a turn as soon as possible. The non-intrusive feedback condition simulates this aspect of conversation. The training system signals that it has a feedback message by sounding a tone. The student surrenders a turn by depressing a special key. These features allow the student to control the system's instructional input.

The fact that our results indicate a superiority for a treatment condition that gives the students control over instructional presentation contrasts markedly with the results of studies of student control of conventional knowledge system instruction in CBI. For example, studies by Judd, O'Neil, & Spelt (1974); Lahey, Hurlock, & McGrain (1973); and White & Smith (1974) all find no performance improvement due to student control of instruction in computer based



instruction. It is not surprising that the effect is not found in these cases, but is found in dynamic skill simulation training. In conventional computer based instruction, students consciously surrender a turn in the "conversational" interaction every time they depress the Return key.

The conversational analogy is just one way of viewing the difference between student control or lack of control of attentional demands. If the student can control the cognitive processing load by postponing instructional feedback until the processing required by the task is at a low level, then more resources will be available to process the instructional message. Furthermore, the resources devoted to the dynamic task during a demanding portion of the episode will not be diverted to processing feedback messages. Further research is called for to determine which of these effects is primarily responsible for improved learning in a non-intrusive feedback environment. It is possible that improved attention to instruction and to the task both have beneficial consequences for learning dynamic skills.

One type of error, joystick manipulation errors, required only perceptual and motor skills, rather than planning or decision making skills. Students in the two treatment groups did not differ significantly in the number of this type of error. This result implies that this perceptual-motor skill complex was less sensitive to the processing load imposed by the dynamic task together with instructional feedback processing than were the decision-making and planning skills called for by the task. Further research is called for to determine the detailed consequences of processing load on performance in dynamic skill training tasks such as the simulated Air Intercept Controller

Task used in this experiment.

More research is also called for to determine other means of improving dynamic skill instruction by reducing or by more effectively distributing processing loads during training. Experiments have not yet been performed to explore the consequences of manipulating the continuity of the simulation in training. (See Munro, et al., 1981, for a plan of research in this area.) In addition, the use of alternate presentation modes for instruction and simulation should be explored. Research on selective attention has shown that simultaneous attention is facilitated by distinguishing the channels of information as much as possible. This suggests the need to experiment with different modalities for task performance and for feedback. In the case of a system such as ours, the dynamic task is largely visual (textual) and tactile (key presses and joystick manipulation). If feedback presentations were by means of computer-generated voice output, rather than text, then the discriminability between the task and instruction would be improved. It is possible that such enhanced discriminability would reduce processing demands and thereby improve learning.

### Summary

The results of the intrusive feedback experiment with the AIC simulation training system do not accord with two commonly accepted precepts of computer based learning. The first of these is that instructional feedback should be as prompt as possible. In this experiment, the group that received immediate feedback performed significantly less well than the group that had the delayed feedback option. The second expectation was that student control over the instructional process would have little, if any, effect. In this experiment, the group that chose the timing of instructional feedback presentations made significantly fewer errors than the group that did not have this control. This finding is not anomalous in view of the differences in processing demand between conventional computer based instruction and dynamic skill training. The transient processing demand fluctuations of dynamic skill training can be exploited by giving students control over the timing of some aspect of instruction.

The most important conclusion to be drawn from this study is that the findings of computer based learning research on knowledge system training may not be applicable to dynamic skill training. Further research is called for to determine the characteristics of an appropriate training methodology for computer based simulation training.

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Intrusive Feedback Group	Non-intrusive Feedback Group
15.67	9.17

## 2-WAY ANOVA

Source of Variation	Sum of Squares	DF	Mean Square	F
Group	9423.297	1	9423.297	74.721 **
Problem	37947.422	29	1308.532	10.376 *
Group x Problem	3618.318	29	124.770	0.989 n.s.
Residual	100511.750	797	126.113	

Table 1  
Total Errors. Analysis of Variance

\*  $P < .01$

\*\*  $P < .001$

Intrusive Feedback Group	Non-intrusive Feedback Group
22.82	14.74

## 2-WAY ANOVA (Last 10 Problems)

Source of Variation	Sum of Squares	DF	Mean Square	F	
Group	4941.145	1	4941.145	75.168	**
Problem	14059.820	9	1562.202	23.765	**
Group x Problem	736.404	9	81.823	1.245	n.s.
Residual	17091.066	260	65.735		

Table 2  
Errors, Last 10 Problems  
Analysis of Variance

\*\*  $P < .001$

Intrusive Feeedback Group	Non-intrusive Feedback Group
2647	2743

## 2-WAY ANOVA

Source of Variation	Sum of Squares	DF	Mean Square	F	
Group	1531126.000	1	1531126.000	3.117	n.s.
Problem	430203136.000	29	14834590.000	30.201	*
Group x Problem	13610033.000	29	469311.438	0.955	n.s.
Residual	391969024.000	798	491189.250		

Table 3  
Time per Problem. Analysis of Variance.

\*  $P < .01$

Intrusive Feedback Group	Non-intrusive Feedback Group
6.14	5.36

## 2-WAY ANOVA FOR CRUCIAL ERRORS

Source of Variation	Sum of Squares	DF	Mean Square	F	
Group	151.928	1	151.928	17.947	**
Problem	12426.016	29	428.483	50.616	*
Group x Problem	197.630	29	6.815	0.805	n.s.
Residual	6746.871	797	8.465		

Table 4

Crucial Errors. Analysis of Variance.

\*  $P < .01$ \*\*  $P < .001$



Intrusive Feedback Group	Non-intrusive Feedback Group
9.53	3.81

## A 2-WAY ANOVA FOR NON-CRUCIAL ERRORS

Source of Variation	Sum of Squares	DF	Mean Square	F
Group	7120.387	1	7120.387	67.743 **
Problem	9352.324	29	322.494	3.068 **
Group x Problem	2967.144	29	102.315	0.973 n.s.
Residual	83772.313	797	105.110	

Table 5  
Non-Crucial Errors. Analysis of Variance

\*\* P < .001

## Mean Joystick Errors per Student

Intrusive Feedback Group	Non-intrusive Feedback Group
31.0	26.6

## T-TEST FOR JOYSTICK ERRORS

T (pooled)	1.03	DF	28
T (not pooled)	1.03	DF	29.96
F ratio=	0.93	DF	14, 14
Not Significant			

Table 6  
Joystick Errors. T-Test .

## APPENDIX

### Types of Student Errors Detected

#### Crucial Errors

- 1 Mishook. To depress a reserved Symbol key when the joystick cursor is not centered (within the error margin) on a blip.
- 2 Fail to hook CAP after appear. To fail to label a CAP within 60 seconds of its first appearance.
- 3 Fail to rehook CAP after first hook. To fail to relabel a CAP within 30 seconds of first labeling it. The blip labeled by the CAP symbol must have moved since the first hook.
- 4 Fail to hook Bogey after appear. To fail to label a Bogey within 24 seconds of its first appearance.
- 5 Fail to rehook Bogey after first hook. To fail to relabel a Bogey within 18 seconds of first labeling it. The blip labeled by the Bogey symbol must have moved since the first hook.
- 6 Fail to rehook Bogey after a heading jink. To fail to rehook a Bogey blip within 36 seconds after it makes a change of course.
- 7 Fail to rehook Bogey after a speed jink. To fail to rehook a Bogey blip within 36 seconds of its change of speed.
- 8 Incorrect pairing for intercept heading. To choose to assign a CAP to an intercept when there is a closer, unassigned CAP to the target Bogey.
- 9 Fail to elicit intercept heading. To fail to elicit an intercept heading to a Bogey within 18 seconds of rehooking the Bogey blip, when there is a free CAP available for the assignment.
- 10 Incorrect pairing for attack heading. To choose to assign a

CAP to attack a Bogey when there is a closer, unassigned CAP to the target Bogey.

- 11 Fail to elicit an attack heading. To fail to elicit an attack heading to a Bogey within 18 seconds of a CAP entering attack range, if the CAP is free or assigned to the Bogey.
- 12 Fail to elicit an attack heading. To fail to elicit an attack heading to a Bogey within 18 seconds of rehooking the Bogey while it is in attack range of the CAP assigned to it.
- 13 Send wrong intercept heading. After eliciting an intercept heading, to send a different intercept than that recommended.
- 14 Fail to send intercept heading. To fail to send an intercept heading for more than 12 seconds after eliciting the intercept heading. Applies only if both CAP and Bogey are still alive at time of error.
- 15 Fail to reassign CAP after splashing Bogey. To fail to either elicit a new intercept or attack heading or to abort the CAP flight for more than 18 seconds after shooting down its Bogey.
- 16 Send wrong attack heading. After eliciting an attack heading, to send a different attack heading than recommended.
- 17 Fail to send attack heading. To fail to send the attack heading for more than 12 seconds after eliciting it. Applies only if both Bogey and CAP are still up.
- 18 Get shot down. Fail to fire when in firing range. When range is very close, Bogey shoots down CAP.
- 19 Fire when not on attack heading.
- 20 Fail to fire in firing range. More than 12 seconds pass without firing since CAP enters firing range.

Non-Crucial Errors

- 1 Fail to rehook CAP after turn to intercept. To fail to rehook CAP for more than 36 seconds after it turns to a new intercept heading.
- 2 Fail to rehook CAP after turn to attack. To fail to rehook CAP for more than 36 seconds after it turns to a new attack heading.
- 3 Send attack heading when CAP not in attack range of Bogey.
- 4 Fire when CAP out of firing range.
- 5 Fire when CAP out of weapons.
- 6 Abort CAP flight prematurely. To send CAP back toward home base while there is still a Bogey on the screen and the CAP has enough fuel.
- 7 Fail to get first fuel update. To fail to elicit information on fuel supply within 60 seconds of first rehook of CAP.
- 8 Fail to get subsequent fuel update. To fail to elicit fuel supply information within 60 seconds of previous fuel update.
- 9 Fail to get first weapons update. To fail to elicit information on weapons quantity within 60 seconds of first rehook of CAP.
- 10 Fail to get subsequent weapons update. To fail to elicit weapons information within 60 seconds of previous weapons update.
- 11 Send intercept heading before eliciting intercept heading for CAP.
- 12 Send attack heading before eliciting attack heading for CAP.

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